

A Dorm Above the Norm

Precast helps USF Student Residence Project Meet an Ambitious Deadline

Collegiate residence halls create a unique combination of design challenges, as they not only require typical housing needs but must also meet their deadline and provide durability that exceeds typical rental units.

The University of Sioux Falls also wanted their new dormitory to be the kind of building where students would not just sleep, but live and interact. The space needed to attract new students as well as lure current students back from off-campus housing.

These needs were met with the help of architectural panels and thin-brick panels.

This August, USF will open its threestory, 46,715-square foot Benedetto Hall—the first new dormitory in more than a decade. The residence hall is named in honor of recently



Architect of Record: **Koch Hazard** • Engineer of Record: **Gage Brothers** (Adam F. Roark, P.E. Senior Engineer) • Contractor: **Sioux Falls Construction** (Construction Manager at Risk) • Photos: **Gage Brothers** • Location: **Sioux Falls, SD**

retired university president Mark Benedetto, who led the college for two decades.

The hall replaces beds lost when an older '60s era residence hall was demolished.

USF took a unique approach to the building's design. In order to best suit the needs of modern university life, they conducted conversations with both current and prospective students along with their analysis of critical trends in student residence life design.

"We integrated current best practices in the field of student development with the needs and desires of a contemporary college student, gathering ideas not just from current students but also prospective students and their families," said Corey Ross, Vice President for Student Development and Dean of Students at USF.

The \$11.7 million residence hall, designed Koch Hazard Architects and built by Sioux Falls Construction, is situated at the north edge of

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campus. Siting and design of the new hall will complete the historic USF campus quad and frames the view into campus from 23rd Street.

Benedetto Hall will have a total of 188 student beds within 94 double rooms that contain two large (11' X 20') double rooms separated by a private bathroom. Other amenities include common areas and study spaces on each floor, multipurpose rooms and kitchen facilities, as well as a fitness room, laundry room and theater for the residents to share.

Added Ross, "Our interior is designed to be as stylish and as comfortable as a modern home, replete with bedrooms on the wings that encircle a 'commons' in the middle of every floor for students to gather, relax and share ideas."

Students will also have fewer excuses for not studying since the residence hall will be attached to the Mears Library—making USF one of the few campuses in America where students are living in the same building as the university library. Talk about living in the library during finals week.

The Precast Advantage

A variety of requirements led the design team to precast concrete

panels. Due to the closure of the halfcentury old residence hall, it became important to complete the new residence hall for the start of the 2017 academic year. As a result, precast concrete was employed to address the tight timeline and meet project requirements.

Architectural precast and brick are the primary materials composing the 1960s Modernist buildings on the northeast area of the USF campus. "Since Benedetto Hall is placed on a prominent corner of campus amongst these 1960s era buildings, it made sense to use the same materials and color schemes to blend in with the adjacent campus context," said Stacey McMahan, lead architect for the project.

Benedetto Hall consists of white acid etched architectural precast highlighting common spaces and vertical circulation within the building, while brick tile precast panels compose the sleeping room portions of the building. The building's design lets in maximum natural light and fresh air into interior spaces.

According to McMahan, using precast panels with brick tile allowed a shorter construction schedule with quicker erection times over traditional masonry construction, while providing the desired aesthetic. The use of precast hollowcore planks provided numerous benefits over other building materials. One of these is that the product's sheer mass, which acts as a thermal sink to smooth peak heating and cooling demands, saves both energy and money. Additionally, hollowcore supplies superior fire safety performance; it provides a noncombustible structure and eliminates the need for additional fireproofing. When you add to this list the benefit of reduced noise and vibration between floors, it makes an excellent choice for college students, who frequently seem to have more energy than can be contained.

Top of the Class

The result of the collaboration with the building team for Benedetto Hall showcases how resilient, sustainable, and cost effective precast construction can be for student housing.

In addition to the savings in time and money, administrators believe that Benedetto Hall will be a place that students will be happy to call home for many years to come.

"This residence hall is a game changer for USF," said Josh Snyder, USF director of athletics, who eyes the construction progress on a daily basis. "The quality of residential life on campus is a prime factor in recruiting prospective students and student-athletes."

He added, "Students desire living spaces that provide them comfort and the ability to interact and engage with others. This hall demonstrates the University's commitment to our student experience."

Benedetto Hall is scheduled to be ready for the fall 2017 semester.



www.gagebrothers.com

Dyer Street Archcast™ Bridge

After a devastating flood hit the city of Waynesville, Missouri in 2013, city officials knew there was major work to be done, including vital infrastructure upgrades to prevent another disaster. In all, the flood damaged nearly 100 homes and businesses in the small town. Reports indicated at least seven inches of rain fell on the area causing the Roubidoux creek running through Waynesville to reach a record 21 feet, after only having about one foot of water before the rain.

One of the infrastructure upgrades was the replacement of a low-water crossing structure by Dyer Street, which connected a city street to the main road. The original lowwater crossing had dammed up a branch of the Roubidoux creek for decades, increasing the likelihood and intensity of flooding. Because of the major impact floods had on the region, state and federal agencies including the Missouri State Emergency Management Agency and Federal Emergency Management



Agency coordinated recovery and infrastructure upgrades for the project.

The new Dyer Street bridge was constructed with a precast concrete bridge system. The city selected the bridge system for its highly durable and simple three-sided design that is delivered ready for quick installation. Additionally, because of budget constraints, city officials decided the best option for saving costs was to build the bridge using their own crews. "The Dyer Street Bridge was a great 'do it yourself' project for the City of Waynesville," said Bruce Harrill, City Administrator. "Working with the precaster, and the knowledgeable technical personnel they provided to the site, allowed our city crews to use the modular design to construct the much-needed bridge while saving the city hundreds of thousands in construction costs."

The Dyer Street Bridge is constructed of twelve 28-foot span by 11-foot rise units, erected side-by-side to create two spans, each six arches wide. City crews built footings onsite while the precast bridge components were being manufactured. After the footings were completed, the precast units were delivered to the site. Once the arch units were in place, precast head and wingwalls were installed to complete the bridge. The convenient modular design allowed city crews to quickly erect the bridge in only three days.

The creek is already in the process of reshaping the natural stream bottom after the September 2016 completion. City Mayor Luge Hardman praised all who were involved with the upgrades to the city. "With the building of the Dyer Street Bridge, we are proud to say the city has no low-water crossings remaining, and is better prepared to meet future water levels.".



Contractor: City of Waynesville • Location: Waynesville, MO



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Augsburg College

The urban Minneapolis school is nearing completion on its Norman and Evangeline Hagfors Center for Science, Business and Religion, a \$73 million, 135,000-square-foot multidisciplinary complex. The integrated-discipline collaborative learning space includes 24 labs and 6,000 square feet of student-faculty research facilities such as biology, business, chemistry, computer science, physics, psychology, math and statistics, and religion.

The intention behind Hagfors is to encourage mixing among branches of academia. "First, the building is student-centered. Everything about the Hagfors Center is meant to support learning experiences from the formal to informal spaces," Augsburg spokesperson Stephanie Weiss said, "It's meant to encourage collaboration among disciplines."



General Contractor: **McGough** • Architect / Engineer: **HGA** • Owner: **Augsburg College** • Location: **Minneapolis, MN**

Augsburg broke ground on the project in April 2016. To date, Hagfors is on budget and on schedule. The project reached its halfway point this past February; it should open in January 2018 as planned. The center was the focus of a successful fundraising campaign, which met and exceeded its goal of \$50 million by last May.

The precaster provided 294 pieces of 10 1/2" insulated precast pieces with cast in thin brick.

The compact campus is located across Riverside Avenue, across from the West Bank of the University of Minnesota in the Cedar-Riverside neighborhood. Augsburg, founded as a Lutheran seminary in 1869, cites its strengths as its urban location, diversity, and being a small institution with strong ties to the community and around the globe. It also sponsors the annual Nobel Peace Prize Forum in America.



www.wellsconcrete.com

MnDOT Highway 24 – Clearwater Bridge over the Mississippi River

This project will replace the old Highway 24 bridge spanning the Mississippi River and CR 7/Main St in Clearwater in Sherburne and Wright counties. The existing bridge was built in 1958. Shoulders are narrow and do not provide adequate room for handicap accessible vehicles, and sidewalks do not meet today's ADA requirements. The new two-lane bridge structure will include wider lanes, shoulders and a pedestrian sidewalk/trail separated by a concrete barrier for improved access and safety.

The new bridge is being built just southeast, or downstream, from

the current structure. Girders are unloaded on the existing bridge and then set in place on adjacent piers.

7 Span Bridge:

- 5 spans of 96x x178' long 110 tons –
 6 beams per span (30 beams total)
- 2 spans of 63" x 140' long 62 tons -8 beams per span (16 beams total)

Hauled from Elk River, MN on specialized trailers with 8 axels (steerable), the entire load is 250 feet long bumper to bumper.

The beam section is the new 96MW section that MnDOT and PCI producers worked to develop in 2010 and is now a MnDOT standard. Span lengths exceeding 200' are possible with this new section.

The river crossing serves commuter, freight and recreational traffic, with current average daily traffic volumes of 14,800 and forecast volumes of more than 30,000 vehicles per day in 2040.





Contractor: Lunda Construction • Engineer: MnDOT • Owner: MnDOT • Location: Clearwater, MN

Learn & Earn Box Lunches

PCI Midwest provides continuing education programs on a variety of topics. These programs are easily tailored to conference room or classroom lunch programs. Architects and engineers can learn about precast concrete hollow-core floors and walls, architectural precast concrete, precast parking structures, glass fiber reinforced concrete, high performance precast concrete and much, much more. Contact mike@pcimidwest.org to request a program for you or your company.

The following programs are prepared and ready for presentation. Please allow a minimum of two- to three-weeks from the date of your submission to the date of your requested presentation.

Discover High Performance Precast (Credits: 1.0) Recent code changes, increasing sustainability requirements, and a challenging economy are just some of the factors increasing demand for high-performance structures. However, high performance is not business-as-usual. The concept of 'highperformance' encompasses sustainability; however, it goes beyond a 'this-or-that' approach by requiring optimization of all relevant attributes for a project on a life cycle basis. This presentation will explain what high performance structures are, and how precast concrete can help you achieve your high performance project goals. The presentation also covers the basics of precast concrete, its applications, finishes, etc.

Artist's Palette: The Aesthetic Versatility of Precast

Concrete (Credits: 1.0) The aesthetics of a structure are very important, as it is what most people identify with. High performance materials should provide aesthetic versatility in order to efficiently meet a structure's architectural requirements. Precast concrete provides incredible aesthetic versatility from providing multiple colors and textures, to developing shapes, forms and very ornate details. Precast can also simulate or be veneered with natural materials providing all of their beauty, but with the added speed, durability, many other benefits of precast. This presentation will provide an overview of the many finishes available with precast concrete, along with methodologies for achieving them. We will also discuss combining multiple finishes into single panels, veneers and embedded materials, selection of mix designs, approaches to achieving colors, proper specification, and procedures to ensure expectations are aligned.



High Performance Precast Concrete Envelope Systems

(Credits: 1.0) A structure's envelope has considerable impact on its overall performance, as highlighted by recent code changes. The envelope not only serves as a barrier between the outside environment and conditioned space, but also as a part of the aesthetic expression for the structure. It must also serve as a protective shield against environmental forces. High-performance building envelopes can help reduce the overall energy consumption of a structure throughout the structure's life, and maintain and protect its interior environment and occupants. This presentation addresses what high performance building envelopes are, as well as key elements to their performance. It will discuss how to use precast concrete wall systems to meet the latest code requirements such as continuous insulation and air barriers, and include topics such as moisture management, thermal mass effect and how to calculate effective R-values, integration with other building systems, and more. This session will also touch on the idea of resilience. A structure must be able to resist environmental forces, such as high winds and earthquakes in order to protect life and fulfill its intended purpose. Case studies are used to highlight information presented.

Designing Precast Concrete School Buildings (Credits: 1.0) After attending this presentation, participants will be able to: Discuss how different Precast/Prestressed components are used in school designs Use the aesthetic features of precast to create structures to meet the unique needs of schools Understand the Precast design process

Designing with Precast/Prestressed Hollow-Core Concrete

(Credits: 1.0) This course instructs participants about hollowcore products and how to design and build utilizing hollowcore floors and walls. Participants also learn about the inherent fire resistance of hollow-core, a major life-safety consideration. After this program, participants will be able to: Identify the different precast, prestressed hollow-core concrete systems Explain the benefits of using precast, prestressed hollow-core concrete Discuss the benefits of using hollow-core concrete with owners and other designers.

Parking Garage Design and Construction (Credits: 1.0) In this course, participants are instructed in improving security and lighting in parking structures and the inherent safety issues. They are also instructed in architectural treatment options for

facades which can make garages more aesthetically pleasing. Participants will also discuss ways to avoid parking structure leakage. From this course, they will be able to use a construction procedure to avoid this leakage.

Precast Housing Structures (Credits: 1.0) In this program, participants will discuss precast, prestressed concrete in the housing market. Precast, prestressed concrete provides long clear spans, shallow cross sections, high load capacities, high durability, compatibility with block, steel and cast-in-place concrete, and attractive appearance. Also learn how owners and residents benefit from low maintenance, two- or four-hour fire ratings, lower fire insurance rates, and strong acoustical control. After this program, participants will be able to: Identify the different precast concrete systems used in housing Explain the benefits of using precast concrete in housing structures Utilize precast concrete structures to benefit clients with fire suppression and environmental issues.

Precast Industrial Structures Design & Construction

(Credits: 1.0) Box lunch attendees will learn the key benefits of precast, prestressed components and see the advantages of an integrated design approach.

Precast Stadiums Design & Construction (Credits: 1.0) Box lunch attendees will learn how working with your precast, prestressed specialist at the earliest stages of design can mean a winning combination of advantages for your next stadium. These include flexibility of design, including long spans; high quality of manufactured products; versatility; high-performance, durable materials; and speed of construction because precast components can be erected quickly once they arrive at the site. After attending this program, participants will be able to: ldentify the different precast, prestressed concrete systems used in stadium designs Explain the benefits of using precast, prestressed concrete in stadiums Discuss the benefits of PCIcertified precast producers

Precast/Prestressed Concrete 101 (Credits: 1.50) Participants will explore building design solutions using precast and prestressed concrete products. They will learn what precast, prestressed concrete products are, how they are manufactured, including structural theory of prestressing, and quality assurance procedures. They will learn about the industry certification program (PCI) of plants, people and performance. Participants will explore numerous examples of architectural and structural concrete solutions for numerous building markets. They will explore a variety of architectural finishes and how each is created in terms of color, form and texture. They will explore common structural solutions using prestressed concrete products and explore integrated solutions; realizing the full potential of loadbearing architectural precast units. The session will end with an overview of industry support available to the design community, including published and electronic media and a question and answer session.

Precast/Prestressed Plant Tour (Credits: 2.0) Attendees will observe firsthand how designs and engineering



details are executed in the precast manufacturing process. They will also observe the entire precast and prestressed manufacturing process from engineering and connections, forms set-up, casting and finishing. Attendees will gain a better understanding of precast and prestressed capabilities and related quality issues. Attendees will learn how precast fits within the entire building system and how to specify precast concrete accurately and safely.

Sustainable Building Design Using Precast Concrete

(Credits: 1.0 After this presentation, participants will understand the following concepts: (1) The key to sustainable building lies in long-life, adaptable, low-energy design. (2) The earth's resources are best conserved if the service life of a building is prolonged. (3) Using precast concrete in buildings conserves energy and resources during and after construction because of the following characteristics of precast concrete: (a) The materials used in precast buildings are natural, renewable, and locally available. (b) Water and materials used in precast buildings are often recyclable and recycled. (c) Indoor and outdoor air quality are improved in precast buildings because less (or no) VOCbased preservatives and paints are required, and because of the thermal mass qualities of precast concrete.

Total Precast Structures (Credits: 1.0) After this program, participants will be more familiar with what a total precast concrete structure is, how a total percast structure can benefit a project, and what components are used to construct a total precast structure. Participants will also learn how to manage a successful project.

Architectural Precast Production & Application

(Credits: 1.0) In this program, students will learn about the practical application of a wide variety of architectural precast solutions. The discussion will include design choices and cost considerations.

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